EXAMINING THE ROLE OF 'MODERNISATION' AND HEALTH-CARE DEMAND IN SHAPING OPTIMAL BREASTFEEDING PRACTICES:
Evidence on Exclusive Breastfeeding from Eastern Indonesia

JAN PRIEBE, FIONA HOWELL, AND MARIA CARMELA LO BUE

TNP2K WORKING PAPER 11d - 2014
June 2014

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Attribution: Priebe, J., F. Howell, and M. Lo Bue. 2014. 'Examining the Role of Modernisation and Health-Care Demand in Shaping Optimal Breastfeeding Practices: Evidence on Exclusive Breastfeeding from Eastern Indonesia', TNP2K Working Paper 11d-2014. Jakarta, Indonesia: Tim Nasional Percepatan Penanggulangan Kemiskinan (TNP2K).

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Layout and typesetting: Purwa Rahmanto

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June 2014

ABSTRACT

The health benefits to mothers and children in adopting optimal breastfeeding practices are well recognized. However, despite many efforts to promote optimal breastfeeding practices in developing countries, only modest progress has been achieved in past decades.

This paper attempts to fill several important research gaps on the socioeconomic determinants of optimal breastfeeding. In contrast to previous studies that have focused on the timely initiation and duration of breastfeeding, this article examines exclusive breastfeeding practices. Using a new data set from Eastern Indonesia, we revisited the 'modernisation' hypothesis and, as a first study in this field, investigated to what extent health-care demand and supply factors influence optimal breastfeeding behaviours.

Controlling for a wide range of individual, household, and community characteristics, our findings suggest that mothers' labour market participation under 'modern' employment contracts negatively affects optimal exclusive breastfeeding practices, and hence provide support for the 'modernisation' hypothesis. Moreover, our results indicate that a higher availability and quality of health-care supply does not necessarily lead to better breastfeeding practices. Only when health-care supply was matched with a significant demand for such services, did we observe a higher chance for optimal exclusive breastfeeding.

Keywords: Exclusive breastfeeding, modernisation, health-care supply, health-care demand, Indonesia.

JEL Classification: I11, I31, O10

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Acknowledgements: The authors would like to thank Isis Gaddis, Stephan Klasen, Suahasil Nazara, Elan Satriawan, and Sudarno Sumarto for valuable input and comments. Special thanks go to SurveyMETER, in particular, to Bondan Sikoki, Ni Wayan Suriastini, and Firman Witoelar for providing clarifications on the IFLS East 2012 data. We also wish to gratefully acknowledge Pamela S. Cubberly for her editorial assistance. Any remaining errors are solely our responsibility.

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1. Introduction

Feeding infants with breast milk has been increasingly shown to play an important role for both maternal and child health: for mothers, breastfeeding has been proven to decrease postpartum bleeding, reduce risk of breast cancer, and by affecting interpregnancy intervals, reduce the risk of maternal (as well as infant) mortality (Jain and Bongaarts 1980; Knodel 1977; Labbok 1999; Newcomb et al. 1994; Rosa 1975, 1976). Breast milk can also improve child health and survival outcomes due to its unique superior nutrients, enzymes, hormones, and important immunologic substances that protect the body against infectious agents[1] (Guilbert et al. 2007); breast milk also reduces the chance of early childhood disabilities (Wehby 2014). At the same time, breastfeeding has been found to positively contribute to the neural and cognitive development of children (Innis et al. 2001; Rey 2003; McCann and Ames 2005; Rothstein 2013).

At the cross-country level, the promotion of optimal breastfeeding practices has been identified as particularly beneficial and relevant for developing countries, which possess limited financial resources (optimal breastfeeding can be considered a cost-free intervention) and are characterized by particularly low health and education outcomes and a large share of the population living in poverty. Consequently, the adoption of optimal breastfeeding practices has been highlighted as one of the main pathways to achieving nutrition-, mortality-, and schooling-related Millennium Development Goals (UNDP 2013a, 2013b).

Following the plethora of scientific evidence, many national and international initiatives have been launched in developing countries in past decades. However, as reported in UNICEF (2014), only little progress on optimal breastfeeding practices has been achieved globally between 1995 and 2011; the East Asia and Pacific region particularly has shown no signs of improvement. In line with these findings, Baker et al. (2006) and Coutinho et al. (2005) concluded that, despite some successful results, many breastfeeding-related interventions have delivered inadequate outcomes.

One reason behind slow international progress on optimal breastfeeding outcomes may be the still very limited understanding of the socioeconomic and sociocultural context that accompanies breastfeeding practices (Roberts et al. 2013). This article's principal objective is to fill some of the knowledge gaps that exist related to the adoption of optimal breastfeeding practices in developing countries.

Several contributions set this article apart from others in the literature. First and in contrast to the vast majority of existing literature, we focused our analysis on studying the determinants of optimal exclusive breastfeeding. The World Health Organization (WHO) has issued three main breastfeeding recommendations: Indicator 1: timely initiation (within one hour of birth); Indicator 2: exclusive breastfeeding up to the age of 6 months; and Indicator 3: continued breastfeeding through to 24 months (Kramer and Kakuma 2007; Labbok and Krasovec 1990; WHO 2008). Existing research has focused only a little on the determinants of indicators 1 and 3 and research on indicator 2 has been almost entirely descriptive (Khanal et al. 2013). We contributed to the existing literature by applying a multivariate regression framework in order to analyse the determinants of exclusive breastfeeding.

[1] These cellular attributes have also been proven not only to be beneficial for infant health but also to play a positive role in preventing subsequent development of diseases such as bacterial meningitis, diarrhea, and respiratory and urinary infections (American Academy of Pediatrics 2005; Chantry et al. 2006; Oddy 2004). Moreover, breastfeeding may prevent obesity (Gillman and Matzoros 2007).

Second, we investigated two main hypotheses related to the adoption of exclusive breastfeeding, which have so far only been studied regarding indicators 1 and 3. A large part of the literature on indicators 1 and 3 has been devoted to research on the so-called 'modernisation' hypothesis (Abada et al. 2001; Adair et al. 1993; Akin et al. 1986; Brady 2012; Gracey 2003; Harrison et al. 1993; Howrigan 1988; Igun 1982; Pérez-Escamilla 2003; Ruel et al. 1999; Solien de González 1963; Veile et al. 2014). According to the modernisation hypothesis, societies experiencing a transition towards higher levels of welfare—often going hand in hand with exposure to marketing activities of infant formula and increasing female employment—have led women to gradually abandon traditional cultural values related to breastfeeding practices to adopt new norms and practices; this includes moving to a shorter period of breastfeeding following birth. Following the empirical literature on the modernisation hypothesis, we further distinguished between two separate subhypotheses: the role of mothers' employment in nontraditional sectors (i.e., clerical, factory, and professional jobs) and the role of mothers' levels of education.

Furthermore, we examined the role of the demand for and supply of health-care services on exclusive breastfeeding practices. Studies on the determinants of indicators 1 and 3 have shown that both the place of delivery and who is in attendance at birth—traditional or modern health workers—has an impact on the timely initiation and length of breastfeeding (Abada et al. 2001; Adair et al. 1993). However, due to data limitations, the existing literature fails to provide evidence on whether factors influencing maternal demand for health services (including mother's knowledge, education level, preferences, etc.) or the supply (availability and quality) of health services is responsible for the relationship found between health services and adopted breastfeeding practices. Controlling for the role of demand and supply factors is likely to be particularly important in a developing country context in which strong traditional beliefs (demand) exist and adequate health-care supply is often not available at the local level. Using a new micro data set for Indonesia that collected a large amount of individual, household (HH), and community-level information, we were able to distinguish between health-care demand- and supply-related factors and their impact on exclusive breastfeeding practices.

Our study drew on information on 1,372 children born to 972 mothers aged 15 to 49 years old in 2006–2012 in the eastern parts of Indonesia, collected in the first round of the Indonesian Family Life Survey East 2012 (IFLS East 2012). Controlling for a large set of control variables, our analysis revealed that mothers' labour participation under 'modern' employment contracts (wage employment) negatively affects an optimal exclusive breastfeeding pattern, which aligns with the modernisation hypothesis. However, we also found that higher education levels of mothers led to better optimal exclusive breastfeeding outcomes, so based on these data, we rejected a link between modern lifestyle norms leading to less optimal exclusive breastfeeding outcomes. Regarding the role of health-care demand and health-care supply factors, our results show that a mother's demand for health-care services and subsequent uptake of these services is a major determinant of optimal exclusive breastfeeding practices. Furthermore, our findings suggest that improving the supply of (quality) health care will not result in better breastfeeding practices if this supply is not matched with mothers' demand for such services; hence, public policies that stimulate the demand for available health-care services are likely to be a crucial and cost-effective intervention that promises to achieve better breastfeeding practices in developing countries.

The remainder of this article is organized as follows: Section 2 briefly discusses the data set and econometric specifications. Section 3 presents and discusses the empirical results. Section 4 summarizes and concludes.

2. Data and Methods

Data and Variables

This article draws on data from the IFLS East 2012, which was carried out in August 2012 in seven provinces of Eastern Indonesia (Kalimantan Timur, Maluku, Maluku Utara, Nusa Tenggara Timur, Sulawesi Tenggara, Papua, and Papua Barat)[2].

The IFLS East 2012 contains detailed socioeconomic and sociocultural information at the individual, household, and community levels (e.g., age, education, employment, infant feeding practices, health service use, reproductive behaviour, wealth, etc.). Furthermore, the IFLS East 2012 comprises a health facility survey that gathered information on the availability and quality of several types of health-service providers disaggregated by type of provider: government health centres (*puskesmas/pustu*) and child health posts (*posyandu*)[3]. In the analysis presented below, we matched the household, community, and health facility data in order to model health-care supply and demand factors.

The IFLS East 2012 was designed to be representative of Eastern Indonesia, which is the less-developed part of the country where traditional health attitudes and knowledge prevail relatively more often in combination with limited availability and quality of public and private health services. Given the lower level of economic development in Eastern Indonesia compared with the rest of the country, we observed enough variation in our data to obtain precise parameter estimates in our subsequent analysis. Likewise, the relative remoteness of many locations sampled in the IFLS East 2012 approximates the context of poorer developing countries.

Our analysis is based on a sample of 972 mothers aged 15–49 years old with 1,372 children born during 2006–12, that is, the 5 years preceding the IFLS survey. Because this study is based on exclusive breastfeeding, we excluded children who were still being breastfed at the time of the survey[4].

Table 1 provides descriptive statistics on the variables used in this study, grouped according to child, mother, household, and health supplier characteristics. Regarding the main variable of interest of this study—exclusive breastfeeding—we found that, on average, mothers exclusively breastfeed their children for about 6.5 months. However, we observed strong variations in exclusive breastfeeding practices across households; only about 23 percent of mothers actually follow optimal exclusive breastfeeding practices (i.e., they stop exclusive breastfeeding after the child reaches around 6 months of age).

Regarding the sets of control and explanatory variables that are included in the empirical analyses, pregnancy- and child-specific characteristics include the sex of the child, birth order, a dummy variable for

[2] The collection of the IFLS East 2012 data was conducted by SurveyMETER and was intended to complement the renowned IFLS rounds from 1993, 1999, 2001, and 2006, which focused on Western Indonesia. The IFLS rounds are well established in the economic literature and considered to have generated high-quality data; these data have been used in a number of highly published academic publications (e.g., Cameron and Williams 2009; Gertler et al. 2009; Maccini and Yang 2009; Thomas et al. 2012). Because SurveyMETER, together with Rand Corporation, was involved in collecting both the 2001 and 2006 IFLS rounds, the data quality of the IFLS East 2012 can be expected to have achieved similar quality standards.

[3] Please see Satriawan et al. (2014) for a more detailed description of the IFLS East 2012 data set and Priebe et al. (2014) for an overview of the health facility data collected for the IFLS East 2012.

[4] Exclusive breastfeeding is defined as a feeding pattern in which infants are given breast milk since birth and no water, no infant formula and liquid supplements, and no food. According to the recommendations of WHO (2008), this feeding practice should be carried out for the first six months of life.

short birth interval (less than 24 months), mother's age at birth, a dichotomous variable on any check-up received during pregnancy, and an indicator (pregnancy check-ups) on the number of prenatal care services received. This last indicator ranges from 0 to 8 based on the following eight services: weighing, height measurement, measurement of blood pressure, test haemoglobin, measurement of fetus height, listening to fetal heartbeat, internal exam, and measurement of the mother's hips.

The mother's characteristics include years of schooling and her job market information (self-employed, employee, casual, or unpaid work).

Regarding households, we controlled for household size and wealth levels (asset index)[5]. Moreover, we considered intergenerational transmission of health knowledge by including a dummy variable that indicates whether a child's grandmother resides in the same household. Likewise, we included an indicator variable on a household's possession of a health insurance (health card), which might affect a household's probability of interacting with formal health institutions (in contrast to traditional practices).

Table 1 also presents descriptive statistics on various health-care suppliers observed at the community level, and tabulates information on both quantitative and qualitative indicators. At the *posyandu* level, we used information on availability (measured by a dummy variable saying whether the *posyandu* is open every month), medical equipment (number of health instruments), and the level of education (years of schooling) of the head and staff working at the *posyandu*. At the *puskesmas* level, we used information on the number of health practitioners providing prenatal care, the average number of working hours per week of health staff, and the years of experience of employed health practitioners and midwives.

[5] The asset index is derived applying principal component analysis using household information on a number of dwelling- and asset ownership–related characteristics. The index ranges from –2.33 to 2.13; higher values reflect higher wealth levels.

Table 1: Descriptive Characteristics

	Mean or Percentage	Std. Dev.	Min.	Max.
Pregnancies / child characteristics:				
Duration of exclusive breastfeeding (months)	6.62	3.63	1	12
Exclusive breastfeeding for 6 months (1=yes; 0=otherwise)	22.96%			
Male children (1=yes; 0=otherwise)	51.90%			
Order of birth	3.29	2.03	1	15
Less than 24-month birth interval (1=yes; 0=otherwise)	7.00%			
Pregnancy check-ups (1=yes; 0=otherwise)	72.23%			
Number of services received during pregnancy	3.45	2.80	0	8
Mother's age at child's birth	28.53	6.33	13	47
Mothers' characteristics:				
Mothers' schooling (number of years)	7.40	3.88	0	12
Mothers self-employed (1=yes; 0=otherwise)	25.38%			
Mothers employed in private or government sector (1=yes; 0=otherwise)	22.61%			
Mothers doing casual jobs and unpaid family work (1=yes; 0=otherwise)	45.93%			
Household characteristics:				
Household size	5.18	1.70	2	13
Asset index	-0.17	1.01	-2.23	2.13
Grandmother living in the household (1=yes; 0=otherwise)	10.42%			
Household possessing a health card (Kartu Sehat) (1=yes; 0=otherwise)	35.35%			
Health-care suppliers characteristics:				
Health instruments available at *posyandu* (number)	37.29	121.89	0	900
Posyandu open every month (1=yes; 0= otherwise)	94.74%			
Schooling of heads and cadres in *posyandu* (average years)	9.46	2.61	2	12
Practitioners providing prenatal care at the *puskesmas* (number)	35.44	37.00	0	173.25
Working hours of practitioners in *puskesmas* (number per week)	31.49	9.58	10	84
Experience of health practitioners in *puskesmas* (average years)	5.07	4.05	0	29
Midwives' experience in *puskesmas* (years)	6.03	4.74	1	22.5
Village population	3,886	5,754	116	62,011

Note: Authors' calculations based on IFLS East 2012. Statistics are derived from the sample of 1,372 children born to 972 mothers in 2006–12.

Methodology

The objective of this article is to examine how (1) modernisation and (2) health-care supply and demand affect exclusive breastfeeding practices in a developing country context.

The modernisation literature, as cited in the introduction, has investigated whether changes in traditional norms and beliefs in the course of the development process might affect beneficial traditional breastfeeding in ways that are detrimental to a child's health resulting in shorter durations of optimal exclusive breastfeeding, that is, 6 months. The majority of the empirical modernisation literature focuses on modernisation that causes a change in mothers' 'attachment' to the labour market, that is, changing from employment close to home with flexible working hours to employment in the formal sector that allows for less flexibility in meeting child obligations.

Following an existing strand of literature on the duration of breastfeeding, we tested the modernisation hypothesis by comparing optimal breastfeeding outcomes (in our case: exclusive breastfeeding) among traditional types of employment (casual jobs, unpaid family work, and self-employment) against modern types of employment (serving as an employee in the private or public sector) using an appropriate multivariate regression framework.

A second strand of the modernisation literature (e.g., Abada et al. 2001) links increases in mothers' education levels to a higher likelihood of adopting modern lifestyle norms, which could negatively affect optimal breastfeeding patterns. We controlled for mothers' education levels in the analysis presented below (proxied by completed years of education).

An important and highly policy-relevant question is whether the demand or the supply for health services affects optimal breastfeeding behaviours. All over Indonesia, medical professionals (excluding traditional health-care suppliers) are trained and asked to provide prenatal and antenatal care, including information on optimal breastfeeding practices to young mothers. Therefore, a mother's attendance at professional pregnancy check-ups is likely to be a vehicle, as well as a proxy, for obtaining information on optimal breastfeeding practices in that the likelihood of receiving relevant information is presumably related to the length/frequency of interactions with health professionals. Because obtaining pregnancy check-ups can be caused by demand (e.g., cultural norms and/or beliefs) and supply-side factors (availability of health services related to pregnancy check-ups), we applied a multivariate regression framework to separate out demand-side effects. After controlling for quality and availability of local health-care services, we came to believe that the 'pregnancy check-up' variable can be interpreted as a proxy for the demand for pregnancy- and birth-related health services. Being able to control for the quality and availability of various pregnancy- and birth-related health-care providers, we have contributed to the existing literature on optimal breastfeeding practices (indicators 1, 2, and 3), which has not been able to distinguish adequately between demand and supply effects.

In order to be able to interpret our variables on pregnancy check-ups as proxies for health-care demand, we further controlled for a large set of mother- and household-specific socioeconomic variables in the multivariate regressions. Table 2 shows that higher levels of education and wealth status of a mother are strongly positively correlated with the number of pregnancy check-ups received. Controlling, for

instance, for education levels and wealth status allowed us to purge the interpretation of the pregnancy check-up variables from simple health knowledge (mother's education level) and financial constraints (wealth level).

Table 2: Maternal Education and Household Wealth by Number of Health-Care Services Received during Pregnancy

Number of Health-Care Services Received	Pregnancies (%)	Mothers' Schooling (years)		Asset Index	
		Mean	Std. Dev.	Mean	Std. Dev.
0	29.45	5.42	3.99	-0.59	0.98
1	3.43	6.88	3.28	-0.61	0.73
2	5.54	5.65	3.46	-0.48	0.79
3	10.86	7.24	3.40	-0.15	0.95
4	11.15	7.77	3.37	-0.07	0.90
5	11.44	8.44	3.62	-0.11	1.03
6	9.84	8.94	3.30	0.19	0.93
7	9.18	9.70	2.89	0.44	0.91
8	9.11	9.57	3.15	0.34	0.98

Note: Authors' calculations based on IFLS East 2012. Statistics are derived for the sample of 1,372 children born to 972 mothers in 2006–12.

In order to analyse the determinants of exclusive breastfeeding practices, given the absence of similar studies, we relied on the econometric approaches applied in the literature on the timely initiation of breastfeeding (indicator 1) and duration of breastfeeding (indicator 3).

The literature on determinants of indicator 3 has increasingly used Cox Proportional Hazard (CPH) models, which is a popular technique in many medical and, in particular, survival/duration-related contexts. As a first step, we followed the indicator 3 literature using a CPH model with a dependent variable of duration (in months) of exclusive breastfeeding[6]. The main analysis, however, similar to the literature on indicator 1, uses a linear probability (LP) model; the dependent variable is dichotomous, taking the value 1 if a child was exclusively breastfed for (exactly) 6 months and otherwise 0. The principal reason for adoption of the LP model is because indicator 2 demands the modelling of an optimality constraint in which both too short and too long exclusive breastfeeding periods represent nonoptimal behaviour. The results section below illustrates and discusses this issue in more detail.

[6] The CPH model is a semiparametric technique that models the effect of predictors and covariates on the hazard rate, leaving the baseline hazard rate unspecified. The two basic assumptions of the CPH model that we used are that, at each time, all the subjects (infants aged 0–12 months) are exposed to a hazard or risk of termination of exclusive breastfeeding and that, at each time, subjects belonging to a given subgroup experience a hazard proportional to the reference category. This model shows some appealing characteristics, as it estimates relative risk and, by using censored data, it controls for truncation bias (Allison 2003). The CPH model also allows stratification across factors that do not have a proportional effect on the hazard function (Kleinbaum and Klein 2005); for this study, urban-rural residence is used as a stratification variable and each stratum has a different baseline hazard function.

3. Results

Determinants of the Duration of Exclusive Breastfeeding

Table 3 presents results when estimating a CPH model in which the duration of exclusive breastfeeding is the dependent variable and negative (positive) coefficients imply increases (decreases) in the length of exclusive breastfeeding. Column 1 presents the baseline specification; columns 2 to 10 present results for the case when health-care demand and supply variables are added to the baseline specification and column 11 presents the full model.

We restricted the interpretation to the full model (column 11) because this model specification is the appropriate variable specification for testing the two hypotheses mentioned. We obtained no support from the data for the modernisation hypothesis. Conditional on a large set of control variables, the results suggest that a higher level of mothers' education is associated with a longer period of exclusive breastfeeding which, assuming that better educated mothers have stronger media exposure compared with less educated women, appears to contradict this subhypothesis of the larger modernisation hypothesis. However, mothers who are self-employed show, ceteris paribus, longer exclusive breastfeeding periods compared with mothers with casual employment and formal employment contracts, which lends some support to the modernisation hypothesis, assuming that self-employed mothers find it easier to reconcile work with family (exclusive breastfeeding) than mothers who are employees.

Regarding the role of health-care demand and supply, we found that a higher demand for health care (pregnancy check-up and pregnancy services) seemed related at a statistically significant level to a shorter duration of exclusive breastfeeding and that health-care supply characteristics showed mixed results. As a robustness check, we ran the same regressions replacing the dependent variable with a less strict definition of exclusive breastfeeding in which water and breast milk are considered to indicate exclusive breastfeeding. Table A1 in the appendix shows the respective results, which are largely consistent with our previous findings in terms of both statistical significance and sign of the coefficients.

Table 3: Duration of Exclusive Breastfeeding: Cox Proportional Hazard Model

	(c1)	(c2)	(c3)	(c4)	(c5)	(c6)	(c7)	(c8)	(c9)	(c10)	(c11)
Village population	.000003	.000005	.000006	.000009	.000006	.0000001	.000001	.000001	.000004	.000001	.000002*
Boy	.0225	-.00596	-.0128	.00241	-.0126	-.00484	-.000016	-.0127	-.0117	-.0268	-.0327
Birth order	.0213	.0211	.0159	.000143	.0154	.0141	.00967	.0151	.0134	.00133	-.00371
Short birth interval	.00601	.0047	.0157	.00484	.0174	.016	-.0294	.0159	.0167	.0235	-.0594
Mother's age at child's birth	.00489	-.00257	-.00134	.00305	-.00111	-.00094	.00144	-.00097	-.00045	-.00292	.000184
Household size	-.0354	-.0074	.00679	.00924	.00672	.00641	.01	.00526	.00525	-.00712	-.0196
Mothers' schooling (years)	.00176	-.0222**	-.0268**	-.0246**	-.0267**	-.0248**	-.0272**	-.0269**	-.0273**	-.0280**	-.0235*
Mothers self-employed	-.188**	-.119	-.112	-.113	-.113	-.0997	-.111	-.106	-.104	-.103	-.0466
Mother doing casual/unpaid household (HH) work	-.0797	-.00934	-.0107	.0177	-.0111	-.00822	.0241	-.00033	-.000097	.0661	.106
Asset index	.0108	-.0275	-.0263	-.018	-.0259	-.0184	-.0165	-.0193	-.015	-.0334	-.0464
Grandmother living in HH	.0157	.00194	-.0771	-.0664	-.0783	-.0883	-.0938	-.078	-.072	-.0561	-.025
Health card	.0106	-.0591	-.0889	-.0669	-.0893	-.0859	-.0774	-.0917	-.0858	-.0744	-.045
Pregnancy services		.134***		-.00306	-.00317	-.00371	-.00727	-.0028	-.00145	-.00782	-.0143
Pregnancy check-up			1.118***	1.191***	1.132***	1.141***	1.206***	1.128***	1.124***	1.220***	1.311***
Posyandu open every month				-.293**							-.452**
Posyandu health instruments (number)					-.00004						-.00001
Pustu practitioners providing prenatal care (number)						-.00139*					-.00162*
Pustu heads' schooling (years)							.0178				.0319**
Pustu practitioners' experience (years)								-.00023			-.0275
Pustu practitioners' working hours									-.00311		.00006
Midwives' experience (years)										-.0107	.00239
h0(0) rural	.90	.92	.95	.95	.95	.95	.96	.95	.95	.95	.94
h0(0) urban	.90	.93	.95	.95	.95	.95	.96	.95	.95	.94	.94
Observations	1,188	1,188	1,188	1,127	1,188	1,188	1,181	1,179	1,179	1,116	1,101

*Note: Authors' calculations based on IFLS East 2012. Dependent variable is the number of months during which the child was fed with breast milk only. The model is estimated using a rural/urban stratification variable. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*

Determinants of Optimal Exclusive Breastfeeding Practices

Given the scarcity of empirical evidence on the socioeconomic determinants of exclusive breastfeeding practices, we found it important to start our analysis by discussing results on the determinants of the duration of exclusive breastfeeding, following the spirit of econometric modelling related to indicator 3 (length of breastfeeding). However, optimal breastfeeding practices related to indicator 2 are clearly defined as a mother exclusively breastfeeding her infant for 6 months implying that shorter and longer durations of exclusive breastfeeding constitute undesirable health practices. An econometric specification using duration models (e.g., the CPH model) is therefore not suitable for studying the determinants of optimal exclusive breastfeeding practices. Before discussing results from an improved econometric specification, this section provides descriptive evidence on the role of nonlinearities in the socioeconomic gradient regarding the length of exclusive breastfeeding.

Table 4 presents average values of mothers' years of schooling and the asset index by length of exclusive breastfeeding. We observed in our data that higher levels of mothers' education and of household wealth tend to be concentrated around 2 to 6 months duration of exclusive breastfeeding. Furthermore, very short (less than 2 months) and very long (more than 7 months) breastfeeding duration is strongly associated with low wealth and education levels[7].

Table 4: Maternal Education and Household Wealth by Length of Exclusive Breastfeeding

Length of Exclusive Breastfeeding (months)	Observations	Mothers' Schooling (years)		Asset Index	
		Mean	Std. Dev.	Mean	Std. Dev.
0–1	140	7.18	3.96	-0.214	1.08
1–2	88	6.90	3.61	-0.084	0.93
2–3	67	8.14	3.97	0.075	1.03
3–4	133	6.98	3.76	-0.044	1.05
4–5	116	8.42	3.75	0.000	0.99
5–6	77	5.85	4.14	-0.613	0.96
6–7	311	8.50	3.42	-0.070	0.96
7–8	60	7.20	3.48	-0.382	0.87
8–9	36	6.55	3.73	-0.306	0.94
9–10	16	5.75	2.88	-0.546	0.70
10–11	10	5.40	3.80	-0.423	0.93
11–12	303	6.83	4.12	-0.254	1.04

Note: Authors' calculations based on IFLS East 2012. Statistics are derived from the sample of 1,372 children born to 972 mothers in the period 2006–12.

[7] The results are consistent with findings from the 2012 Indonesian Demographic and Health Survey (BPS, MoH, and ICF International 2013) and the Indonesian Ministry of Health's Riskesdas survey from 2013 (MoH 2014), which show a higher length of exclusive breastfeeding among mothers in the lowest wealth quintile.

Following the definition of optimal exclusive breastfeeding, we estimated an LP model in which the dependent variable was dichotomous, taking the value 1 if a child was exclusively breastfed for (exactly) 6 months and otherwise 0. Table 5 presents the results from the LP model. Similar to the table on the CPH model, we show different specifications in the different columns and column 11 containing the full model.

The main results of this paper (column 11, table 5) lend support to both the modernisation and the health-care demand/supply hypotheses. For the modernisation hypothesis, our findings suggest that, similar to studies on indicators 1 and 3, a mother's labour force participation seems to negatively affect optimal breastfeeding behaviour, suggesting that a clear competition exists between maternal employment and breastfeeding, mainly attributable to the rise in the mother's opportunity cost of time: working as an employee in the public and private sector significantly decreases the probability that mothers will exclusively breastfeed their child for six months; women involved in casual work and unpaid family work or self-employment have a positive probability of performing optimal exclusive breastfeeding practices. More precisely, our results seem to suggest that only certain elements of the modernisation hypothesis hold for indicator 2, namely, those in which modernisation and development are considered in the context of women's increasing participation in more modern and formal employment contracts. However, we found that, ceteris paribus, better-educated mothers are more likely to practice optimal exclusive breastfeeding practices, which does not support the view that modern norms have a negative influence on optimal breastfeeding behaviour. In fact, our findings suggest the opposite: more highly educated mothers show, ceteris paribus, better exclusive breastfeeding behaviours.

Concerning our hypotheses on the role of health-care demand and health-care supply factors, we derived strong empirical support for health-care demand–related factors playing an important role in following optimal exclusive breastfeeding practices. More specifically, controlling for quantity and quality of health-care supply, health-care demand–driven interaction with health practitioners during pregnancy affects maternal knowledge on the optimal timing and benefits of breastfeeding and therefore it has a positive effect on the likelihood that a mother will feed her baby exclusively with breast milk for six months. However, we did not find that health-care supply in itself, beyond its role in satisfying health-care demand, has any additional effect on optimal exclusive breastfeeding practices.

As a robustness check, we performed three alternative specifications of the model (see table A2 in the appendix). The first substitutes the dependent variable with a dummy in which giving water to the infant in addition to breast milk is still considered optimal exclusive breastfeeding if it occurs at exactly six months ('breastfeeding-wider'); the second uses a dependent variable in which exclusive breastfeeding is defined to take place from 5 to 7 months (instead of strictly 6 months); the third applies a Probit-model (instead of a LP model). In all the three cases, our previous results are confirmed.

Table 5: Determinants of Optimal Exclusive Breastfeeding (Six Months), OLS Estimates

	(c1)	(c2)	(c3)	(c4)	(c5)	(c6)	(c7)	(c8)	(c9)	(c10)	(c11)
Village population	-.000002	-.000001	-.0000001	-.000001	-.000001	-.0000001	-.000001	.0000001	-.000001	-.00000001	-.0000001
Rural	-.00671	.00659	-.0116	.0099	-.00052	.0111	.0209	.00537	.00505	.0156	.0267
Boy	-.0138	-.0253	-.0221	-.0227	-.0255	-.027	-.0157	-.0213	-.0227	-.0300	-.0235
Birth order	-.0172*	-.0134	-.0154	-.0152	-.0145	-.0131	-.0141	-.0138	-.0122	-.0197*	-.0211*
Short birth interval	-.0600	-.0582	-.0518	-.0783	-.0518	-.0561	-.0678	-.0542	-.0563	-.0898	-.0714
Mother's age at child's birth	.00319	.000912	.0016	.000887	.00122	.000816	.000995	.000625	.000364	.000117	.000592
Household (HH) size	-.00241	.00298	.00368	.00401	.00348	.00456	.00245	.00346	.00287	.00911	.00737
Mothers' schooling (years)	.0223***	.0152***	.0167***	.0132***	.0145***	.0142***	.0133***	.0150***	.0150***	.0137***	.0119**
Mother self-employed	.0533	.0854**	.0709**	.0838**	.0836**	.0785**	.0792**	.0824**	.0821**	.0920**	.0828**
Mother doing casual/unpaid HH work	.0615	.0854**	.0715*	.0845**	.0846**	.0806**	.0845**	.0849**	.0840**	.0957**	.0864*
Asset index	-.0273	-.0418**	-.0392**	-.0328*	-.0420**	-.0453**	-.0306	-.0371**	-.0418**	-.0322	-.0279
Grandmother living in HH	-.00956	-.00725	-.0247	-.0153	-.0122	-.012	-.00784	-.0152	-.0163	-.0178	-.00696
Health card	.0354	.00441	.0119	.00571	.0011	.00105	.00377	.00161	-.0016	-.0127	-.0133
Pregnancy services		.0408***		.0298***	.0287***	.0296***	.0313***	.0295***	.0293***	.0319***	.0326***
Pregnancy check-up			.220***	.103**	.0959**	.0902**	.101**	.0923**	.0920**	.105**	.101*
Posyandu open every month				.00382							-.00698
Posyandu health instruments (number)					-.00012						-.00013
Pustu practitioners providing prenatal care (number)						.00056					.000614
Pustu heads' schooling (years)							.00442				.00152
Pustu practitioners' experience (years)								-.00491			-.00313
Pustu practitioners' working hours									.00118		.000294
Midwives' experience (years)										-.00123	-.00076
Constant	.00846	-.0714	-.0958	-.0944	-.0882	-.116	-.146	-.0642	-.115	-.0811	-.102
Observations	1,188	1,188	1,188	1,127	1,188	1,188	1,181	1,179	1,179	1,116	1,101
Adj R-squared	.028	.083	.073	.089	.087	.087	.092	.089	.087	.091	.094

*Note: Authors' calculations based on IFLS East 2012. Dependent Variable is coded as dichotomous variable taking the value of 1 if a child was exclusively breastfed for six months. Standard errors are clustered at the village level. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*

4. Conclusion

Optimal breastfeeding practices have been demonstrated in many medical studies to contribute to improved health outcomes among both mothers and infants. Moreover, the promotion of such practices has been pointed to as particularly beneficial and relevant for developing countries, which possess limited financial resources (optimal breastfeeding can be considered a cost-free intervention) and are characterized by particularly low health and education outcomes and a large share of the population living in poverty.

Despite the circumstance that many programs and campaigns have been rolled out in developing countries in past decades to foster optimal breastfeeding practices, only little progress has been observed. One explanation for the limited achievement on improving optimal breastfeeding practices can be attributed to the still very limited understanding of the socioeconomic and sociocultural contexts that affect differences in breastfeeding behaviours across individuals, regions, and countries.

This article examined the socioeconomic determinants of exclusive breastfeeding (indicator 2) which, in contrast to the other two main indicators of optimal breastfeeding behaviour (timely initiation and continued breastfeeding through 24 months), have received little attention in the academic literature. In this context, we re-visited the question whether modernisation (mothers' types of employment and mothers' education levels) is significantly related to optimal exclusive breastfeeding behaviour. Furthermore and a major improvement over previous studies, we investigated the role of health-care demand and supply in causing women to take up pre-natal care services, which can be viewed as an important source of knowledge about optimal breastfeeding practices. Relying on a new micro data set for Eastern Indonesia that collected a large amount of individual-, household-, and community-level information, we were able to distinguish between health-care demand and supply factors and their impact on exclusive breastfeeding practices.

Our results showed that mothers' labour participation under modern employment contracts (wage employment) negatively affects an optimal exclusive breastfeeding pattern, a finding that aligns with the modernisation hypothesis. However, we also found that higher education levels of mothers lead to better optimal exclusive breastfeeding outcomes and, based on the data, we rejected a link between modern lifestyle norms leading to less optimal exclusive breastfeeding outcomes.

Regarding the role of health-care demand and health-care supply factors, our results show that a mother's demand for health-care services and subsequent uptake of these services is a major determinant in optimal exclusive breastfeeding practices. Furthermore, our findings suggest that improving the supply of (quality) health care will not result in better breastfeeding practices if supply is not matched with mothers' demand for such services. Hence, public policies that stimulate the demand for available health-care services are likely to be a crucial and cost-effective intervention that promises to achieve better breastfeeding practices in developing countries.

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Appendix

Table A1: Duration of Exclusive Breastfeeding (Wider Definition): Cox Proportional Hazard Model

	(c1)	(c2)	(c3)	(c4)	(c5)	(c6)	(c7)	(c8)	(c9)	(c10)	(c11)
Village population	.000002	.000002	.000003	.000006	.000003	-.000001	.000005	.000003	.000002	.000004	.000006
Boy	.00562	-.0304	-.0309	-.00946	-.0318	-.0189	-.014	-.0307	-.0268	-.046	-.0291
Birth order	.0278	.0287	.0195	.00418	.021	.0183	.00552	.0195	.0171	.0164	.00689
Short birth interval	-.0392	-.022	.00507	-.00885	-.00053	.00552	-.0304	.00473	.00546	.0294	-.0436
Mother's age at child's birth	.00621	.000438	.00266	.00758	.00207	.00296	.00672	.00251	.0032	-.00038	.00316
Household (HH) size	-.0392*	-.0116	.00352	.00597	.00371	.00333	.00765	.00142	.0017	-.0133	-.0214
Mothers' schooling (years)	.000979	-.0203*	-.0251**	-.0240**	-.0252**	-.0225**	-.0263**	-.0253**	-.0261**	-.0239*	-.0173
Mother self-employed	-.188**	-.119	-.113	-.12	-.112	-.092	-.111	-.111	-.108	-.125	-.0543
Mother doing casual/unpaid HH work	-.0814	.00697	-.00537	.031	-.00465	-.00187	.0282	.000811	.00125	.0812	.12
Asset index	.0375	.00421	.012	.0255	.0113	.0194	.0245	.0162	.025	.0276	.0244
Grandmother living in HH	.0505	.0352	-.0275	-.0177	-.0257	-.0425	-.0119	-.0253	-.0171	-.022	.0392
Health card	-.0237	-.0999	-.133**	-.112*	-.131**	-.128**	-.124*	-.138**	-.127**	-.137*	-.121
Pregnancy services		.130***		.003	.00651	.00441	.0026	.00557	.00759	.000469	-.00497
Pregnancy check-up			1.032***	1.086***	1.003***	1.029***	1.082***	1.003***	1.001***	1.079***	1.167***
Posyandu open every month			-.292**							-.382**	
Posyandu health instruments (number)				.000111						.000106	
Pustu practitioners providing prenatal care (number)				-.00214**					-.00230**		
Pustu heads' schooling (years)					.0216				.0347**		
Pustu practitioners' experience (years)						.000163			-.00619		
Pustu practitioners' working hours							-.00547		-.00206		
Midwives' experience (years)								-.0113	-.0108		
h0(0) rural	.89	.92	.95	.94	.94	.94	.96	.94	.94	.94	.94
h0(0) urban	.90	.93	.95	.95	.95	.94	.97	.95	.94	.94	.94
Observations	1,188	1,188	1,188	1,127	1,188	1,188	1,181	1,179	1,179	1,116	1,101

*Note: Authors' calculations based on IFLS East 2012. Dependent variable is the number of months during which the child was fed with breast milk and water only. Stratification by urban/rural residence is applied. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*

Table A2: Robust Checks on the Determinants of Optimal Infant Feeding Practices

	Breastfeeding–Wider		Exclusive breastfeeding 5–7 months		Probit	
	Baseline	Full	Baseline	Full	Baseline	Full
Mother's education	.014***	.010**	.013***	.019***	.053***	.039**
Mother self-employed	.041*	.004*	.069*	.085*	.278**	.278**
Mother doing casual/unpaid HH work	.081**	.051*	.017*	.108**	.266**	.280*
Pregnancy services	.029***	.031***	.034***	.032***	.088***	.096***
Pregnancy check-up	.101**	.116**	.198***	.245***	.567**	.720**

*Note: Authors' calculations based on IFLS East 2012. 'Baseline' model specification comprises all variables used for 'column 1' specifications, while the 'Full' model refers to the specifications shown in 'column 11', including additional covariates on health-care supply and demand. 'Breastfeeding-Wider' refers to the definition of exclusive breastfeeding is defined as providing breast milk and water but no solid food. 'Exclusive breastfeeding 5–7 months' refers to the case in which optimal exclusive breastfeeding is not defined strictly as 6 months but in the range of 5-7 months. 'Probit' refers to the case in which parameter estimates and standard errors are obtained using a Probit model instead of an LP model. Standard errors are clustered at the village level. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*

The health benefits to mothers and children in adopting optimal breastfeeding practices are well recognized. However, despite many efforts to promote optimal breastfeeding practices in developing countries, only modest progress has been achieved in past decades.

This paper attempts to fill several important research gaps on the socioeconomic determinants of optimal breastfeeding. In contrast to previous studies that have focused on the timely initiation and duration of breastfeeding, this article examines exclusive breastfeeding practices. Using a new data set from Eastern Indonesia, we revisited the 'modernisation' hypothesis and, as a first study in this field, investigated to what extent health-care demand and supply factors influence optimal breastfeeding behaviours.

Controlling for a wide range of individual, household, and community characteristics, our findings suggest that mothers' labour market participation under 'modern' employment contracts negatively affects optimal exclusive breastfeeding practices, and hence provide support for the 'modernisation' hypothesis. Moreover, our results indicate that a higher availability and quality of health-care supply does not necessarily lead to better breastfeeding practices. Only when health-care supply was matched with a significant demand for such services, did we observe a higher chance for optimal exclusive breastfeeding.

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Printed on recycled paper

ISBN 9786022751182